


# TECHNICAL MEMORANDUM


## Utah Coal Regulatory Program

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July 30, 2012

TO: Internal File

THRU: Steve Christensen, Permit Supervisor  
Daron Haddock, Coal Program Manager 

FROM: Ken Hoffman, Hydrologist 

RE: Revised Probable Hydrologic Consequences Update, Genwal Resources, Inc.,  
Crandall Canyon Mine, C/015/0032, Task ID #4103

### SUMMARY:

On May 30, 2012, the Division of Oil, Gas and Mining (the Division) received a letter from the legal counsel of Genwal Resources, Inc. (the Permittee) providing a revised probable hydrologic consequences determination (revised PHC) for the Crandall Canyon Mine (Task ID #4103). The amendment provides revisions to Appendix 7-15, *Probable Hydrologic Consequences Determination*. The Permittee previously submitted a PHC update on November 30, 2011 (Task ID #3983); however, this submittal was found to not meet the requirements of DO-10A and was returned as deficient on January 30, 2012.

Upon completing its technical review, the Division finds that the amendments are deficient and that additional information/revisions are required prior to receiving final approval. The PHC deficiencies identified during the technical review have been broken out separately. The response to these PHC deficiencies must be submitted by November 30, 2012.

The current amendment does not meet the State of Utah R645-Coal Mining Rule requirements for the PHC. The following deficiencies must be addressed prior to final approval:

**R645-301-122, R645-301-130, R645-301-728.200:** The Permittee must supply supporting data providing a basis for these determinations, or modify/remove the following statements in Appendix 7-15. Two figures based on the descriptions on page 19 and 20 should be prepared to depict the approximate pumping discharge ponding and gravity discharge ponding. Figures shall include elevation of groundwater percolation/upwelling and flow path elevations. (KH)

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**R645-301-728.310:** The Permittee must reinsert Table 1 and correct the following errors or deficiencies in Table 1 to describe whether adverse impacts may occur to the hydrologic balance: (KH)

- Acid-toxic Materials, Table 1, Page 52: The likelihood of toxic-forming materials must be shown as either “moderate” or “high”. The elevated (greater than 1 mg/L) iron concentrations in the untreated mine water discharge are evidence that “toxic-forming materials” are present within the coal, overburden, or underburden at the Crandall Canyon mine.
- Groundwater Availability, Table 1, Page 52: The probability of occurrence for interception of inactive zone groundwater by mine workings is “high (observed)” not “low”. This table entry must be revised to agree with the inactive zone groundwater discussion presented elsewhere in the PHC.
- Surface Water Quality, Table 1, Page 52: An entry is required identifying “spilled or residual treatment chemicals” as a potential impact to surface water quality.
- Surface Water Quantity, Table 1, Page 52: The Permittee must revise this table entry or explain how mine discharge treatment to reduce iron concentrations is a mitigation measure for surface water quantity.
- Surface Water Quantity, Table 1, Page 52: Toxicity was detected during WET testing from the treatment plant discharge on June 7 and 28, September 1, October 3, and October 11, 2011. The Permittee shall add an entry to the table for surface water quality toxicity with a probability of occurrence of “high (observed)” and mitigation.
- Surface Water Quantity, Table 1, Page 52: The August 22, 2011 *Crandall Canyon Mine Macroinvertebrate Study* states “*there continues to be a less healthy macroinvertebrate community at both CRANDMD-02 and CCRANDLWR-03, which are downstream of the discharge, than at CRANDUP-01, which is upstream of the discharge.*” The Permittee shall add an entry to the table for surface water quality damage to macroinvertebrate communities and habitat with a probability of occurrence of “high (observed)”.

**R645-301-120:** The Permittee must address the following deficiency to ensure the application contains current information which is clear and concise. Increased Sediment Loading, 2<sup>nd</sup> paragraph, Page 29: The storage volume values provided for the discussion of the sediment pond do not agree with values provided in Appendix 7-4 Sediment and Drainage Control Plan, Table 11 Sediment Pond Design. Revise the text or Appendix 7-4 as appropriate. (KH)

## ENVIRONMENTAL RESOURCE INFORMATION

Regulatory Reference: Pub. L 95-87 Sections 507(b), 508(a), and 516(b); 30 CFR 783., et. al.

### HYDROLOGIC RESOURCE INFORMATION

Regulatory Reference: 30 CFR Sec. 701.5, 784.14; R645-100-200, -301-724.

#### Probable Hydrologic Consequences Determination

The amendment does not meet the Probable Hydrologic Consequences Determination of the State of Utah R645-Coal Mining Rules. The amendment contains deficiencies involving whether the discharge is related to climatic variability, inconsistencies within the MRP concerning sedimentation pond sizing, and documentation of observed and possible impacts to surface and groundwater. The following deficiencies must be addressed prior to final approval.

The previous technical analysis (Task ID #3983) identified a deficiency relative to the Permittee's that additional flow in Crandall Creek was beneficial and whole effluent toxicity testing (WET). Macroinvertebrate reports performed on Crandall Creek indicate possible negative impacts downstream of the mine discharge. The Permittee has revised the statement and included the macroinvertebrate studies as Appendix 7-69. WET testing result including documentation of the results of the initiated toxicity identification evaluation (TIE) from the fall of 2011. In addition, the results of this testing is included as Appendix 7-70.

The previous technical analysis (Task ID #3983) identified deficiencies involving impacts involved in the interception of groundwater. The Permittee provides details and designation of shallow active-zones of groundwater and deep inactive-zone. The Permittee documents their belief the 5,950,000,000 gallons groundwater, intercepted since 1996, has been from the deep inactive-zone. This deep inactive-zone groundwater is held within the Blackhawk or Starpoint Formations. The Blackhawk Formation is estimated to hold approximately 16 billion gallons of inactive-zone groundwater in storage and the Starpoint Formation is estimated to hold 8.9 billion gallons of inactive-zone groundwater in storage.

Further the conducted a field investigation of surface water to evaluate if impacts of diminished surface flow could be observed due to vertical communication of shallow active-zone groundwater to the mine water discharge. The 2011 field survey did not find any signs of diminished surface water flow. Continued monitoring with constantly be evaluating for this possibility and the isotopic analysis of the mine water discharge will help evaluate the presence of modern water in the discharge.

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The previous technical analysis (Task ID #3983) identified deficiencies involving the duration of the high levels of total iron in the mine water discharge. This issue was addressed by the Division's Board in Board Order 2010-026 filed March 6, 2012 which found:

*"Based on Petersen's opinion and the data set forth in his reports, including in Figure 7 as discussed above, but given the uncertainty surrounding whether the above-limit total iron levels will extend significantly into 2014, the Board finds that the above-limit iron concentrations are not likely to persist for more than three years. The Board therefore finds that 3 years is an appropriate duration upon which to base a bond."*

Given the Board's findings the Division will continue to update the Board on the total iron concentration annual. Given the Board's decision the duration deficiencies are adequately addressed.

The previous technical analysis (Task ID #3983) identified deficiencies involving impacts from mine water discharge. The Permittee documents conversations with staff involving the historic flow record and has updated Figure PHC-1 with a note that *"accuracy of the discharge data reported between January 2008 and 19 March 2010 cannot be verified."* The Permittee further investigates if discharge rates are influence by climatic or seasonal variability. The Permittee reasonably demonstrates the discharge appears to be independent of seasonal variability and depicts this in Figure PHC-1. A legacy commitment about pumping from Crandall Creek is also addressed that this practice has ceased so an evaluation of maximum pumping rates is no longer needed.

However, Permittee fails to demonstrate the discharge is not related to changes in barometric pressure a form of climatic variability. Further the Permittee documents on Page 20 that the barometric pressure does vary in relations to change in pressure stating: *"It has been observed by Genwal Resources personnel that recent increases in the mine discharge rate seem to correlate with the passage of weather fronts or the onset of cold weather"*. This shows that changes in flow can be correlated to changes in barometric pressure but not precipitation. This is a climatic variation so the statement *"Additionally, there is no correlation evident between mine water discharge rates and climatic variability"* is unsupported and remains deficient and should be reexamined. If currently available weather station data is insufficient to examine climatic variability at the mine then a plan to collect that data shall be presented.

The previous technical analysis (Task ID #3983) identified deficiencies of tables and figures which were included in previous submittals which were returned deficient yet continued to be referenced. Table 1 Summary of spring and seep results, 1980-95 is now included as Appendix 7-72 and Figures PHC – 1 through 6 are included in the PHC. In addition, the Permittee updated the tense involving the CVSSD culinary water treatment plant construct and documented when the

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The previous technical analysis (Task ID #3983) identified deficiencies involving adverse impacts to the hydraulic balance. The Permittee responded to this deficiency by removing the table at issues. Table 1 is very descriptive of the possible impacts to the hydraulic balance and is a good inclusion in the PHC. The table should be reinserted and address the Division's original deficiencies.

The previous technical analysis (Task ID #3983) identified deficiencies involving toxic and acid-forming materials. The Permittee added language involving the need for water treatment of the high levels of total iron as documenting the results of the WET testing which had positive results for toxicity. The WET test results also documented that these toxicity testing results were brought about the change in chemical, careful management of the chemical treatment, routine monitoring of residual treatment chemicals, and the procedures for evaluating residual treatment chemicals. To document the chemicals being used the Permittee has included the MSDS sheets in Appendix 7-70.

The previous technical analysis (Task ID #3983) identified a deficiency involving consistency between Appendix 7-4 Sediment and Drainage Control Plan, Table 11 and the Increased Sediment Loading Section of the PHC. This issue was not addressed and remains deficient.

**Finding:**

The amendment does not meet the Probable Hydrologic Consequences requirements of the State of Utah R645-Coal Mining Rules. The following deficiencies must be addressed:

**R645-301-122, R645-301-130, R645-301-728.200:** The Permittee must supply supporting data providing a basis for these determinations, or modify/remove the following statements in Appendix 7-15. Two figures based on the descriptions on page 19 and 20 should be prepared to depict the approximate pumping discharge ponding and gravity discharge ponding. Figures shall include elevation of groundwater percolation/upwelling and flow path elevations. (KH)

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